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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
Bureau of Agricultural and Industrial Chemistry
Microbiology Research Division

To: Geo. W. Irving, Jr., Assistant Chief of Bureau.

From: Arthur M. Kaplan, Bacteriologist, Microbiology Research Division, BAIC.

Subject: Report of field trip to Chicago, Omaha, Kansas City, New York and vicinity for the purpose of investigating possible evaluation by the industry of the Microbiology Research Division's egg white fermentation process, from January 17-31, 1950.

Progress of laboratory studies dealing with the development of pure culture methods for fermenting egg white warranted consultation with egg processors and others in the industry for the purpose of evaluation of our process under plant conditions. Details of the discussions held with representatives of fifteen firms are presented below.

January 18, 1950

Swift & Co., Union Stock Yards, Chicago, Illinois

Dr. Roy C. Newton, Vice President in Charge of Research

Dr. H. E. Robinson, Assistant Director of Research

Dr. E. E. Rice, Biochemist

Dr. C. H. Koonz, Research Biologist

Mr. C. Hale, Bacteriologist

Mr. L. B. Jensen, Bacteriologist

Dr. H. S. Mitchell, Director of Research Laboratories

A preliminary meeting was held with Dr. Roy C. Newton, Dr. H. E. Robinson, and Dr. E. E. Rice. Following a presentation of the characteristics of our process, a more detailed discussion was held with Dr. C. H. Koonz, Mr. C. Hale and Mr. L. B. Jensen. They were shown a sample of pan dried albumen that had been fermented by our process and were told general characteristics of the process. No specific details of our process were given. Dr. Koonz was interested in the process and brought Dr. H. S. Mitchell into the meeting. Dr. Mitchell was very interested in possible collaboration with the Bureau and indicated complete approval of any commitments that Dr. Koonz made. They would first want to evaluate our process on laboratory scale and, pending the results of the laboratory tests, would then be willing to evaluate the process at their Des Moines, Iowa plant using 9,000-10,000 lb. batches. The fermented whites would be dried using their patented foam drying process. This would be the only type of drying operation used. They signified that they had equipment for pure culture techniques and also indicated their willingness to have the Division's representative present in the laboratory and at the plant during the work. They also indicated that they had bakery

facilities. I was shown a sample of the edible albumen they produce. They claim that it is the finest produced today but, at the close of the meeting, Dr. Koonz indicated to me in an aside that their fermentation process "wasn't all it should be" and again reiterated his great desire to collaborate with the Bureau. Dr. Mitchell pointed out that a large surplus of frozen egg white is on hand and the need for a market or for utilization of this product is acute. No opportunity to inspect their laboratory or bakery facilities presented itself.

Wilson & Co., Union Stock Yards, Chicago, Illinois

Mr. W. C. Loy, Laboratory Director

Dr. L. G. Herman, Bacteriologist

Mr. C. B. Dennis, In Charge of Dried and Frozen Food Sales

Mr. J. J. Kenney, In Charge of Egg Sales

Mr. O. Pickens, In Charge, Bakery Testing Laboratory

Mr. Loy and Dr. Herman have been trying to work out a method for the fermentation of egg white but have not been able to develop a suitable process. Their reaction to the sample of egg albumen shown them was most favorable as was that of Mr. Dennis and Mr. Kenney. The latter emphasized the need to find some way of utilizing the surplus frozen white on hand. Mr. Loy and Dr. Herman were impressed with the general characteristics of our fermentation process and offered Wilson and Company's plant facilities at Abilene, Texas, and Atchison, Kansas. Batches from 3,000 to 8,000 lbs. are able to be fermented there and they are perfectly willing to risk several batches of this size at their own expense. Equipment for pure culture fermentation of the type needed for our process is evidently not available at these plants. Mr. Pickens stated that he had never been able to bake a good angel food cake with dried albumen. This was reiterated by Mr. Loy. They were surprised to learn that we had baked several excellent angel food cakes, using our albumen. The baking laboratory is completely equipped and very competently staffed. Mr. Pickens offered the facilities for the baking evaluation of dried albumen fermented by our process. He also gave me a white cake recipe that could be used for further evaluation of the baking properties of dried albumen. Mr. Loy showed me a sample of Swifts albumen that had off flavor and odor. Mr. Loy requested that our procedure for the determination of sugar in egg white be forwarded to them. Mr. Loy indicated that there is an excellent market for a good grade edible dried albumen for use in prepared cake mixes.

Institute of American Poultry Industries, Chicago, Illinois

Dr. Cliff D. Carpenter, President

Dr. Carpenter was helpful in suggesting additional members of the industry that should be approached and in making appointments for me. He was interested in our process to the extent of asking that a nontechnical discussion of the process be furnished him for publication in U.S. Egg & Poultry Magazine as soon as the information was cleared for release. He also requested that a paper be prepared for presentation for the 1951 Fact Finding Conference.

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January 19, 1950

Ovson Egg Products, Inc., Chicago, Illinois

Mr. Morris Ovson, President

Mr. Leo Ovson, Vice-President

Ovson Egg Products Inc. is one of the largest egg processors in the country and is a subsidiary company of National Dairy Corporation. Mr. Morris Ovson has been in the business for over 30 years and ran an egg processing plant in Shanghai, China for 2 years. The concern is not in the egg white drying business at present. Because it has a very large surplus of frozen whites on hand, however, it has just appropriated \$10,000 as its share to the support of a research program dealing with the fermentation and drying of egg white. The research program is being conducted by the National Dairy Research Laboratory Inc. at Oakdale, Long Island. Ovson's purpose is to build or convert a plant for the production of dried egg albumen based on the results of pilot plant studies carried out at Oakdale. They were therefore most receptive to the thought of possible collaboration with the Bureau and stand ready to offer all the possible help they can. Mr. Leo Ovson stated that they had lost 60 percent of their investment in frozen whites recently. He pointed out that frozen egg whites had been selling for 34¢/lb. a year ago and were now down to 13¢/lb. with few buyers. Since arrangements had been made to visit the laboratory at Oakdale, specific details on possible collaboration were not discussed pending my visit to Oakdale. Mr. Morris Ovson on examining our sample of albumen stated that it was one of the finest samples he had seen.

Mid-Continent Food Products, Chicago, Illinois

Mr. J. G. Odell, President

Mr. Odell was most anxious to collaborate with the Bureau in every way possible. His firm handles a large quantity of egg products and he was willing to risk any amount of frozen egg white and supply all necessary plant facilities as soon as possible for the evaluation of our process. He stated that some firms have lost as much as \$200,000 and this year was the worst the trade had seen since the thirties. He further stated that our process, if proven out, would be one of the greatest boons the industry could receive. He called in Mr. James M. Gorman, Industrial Chemical Engineer, National Egg Producers' Association to evaluate the sample of albumen I had. It was their considered opinion that the sample was very good from an organoleptic point of view. Mr. Odell requested that I return the next day for further discussion.

National Egg Producers Association, Chicago, Illinois

Dr. O. J. Kahlenberg, Director of Research

Mr. J. M. Gorman, Industrial Chemical Engineer

A general discussion was held with Dr. Kahlenberg and Mr. Gorman in regard to methods used for the evaluation of egg white. The laboratories of the association are small but well equipped for the type of work done.

Dr. Kahlenberg had just concluded a series of classes dealing with problems encountered in the quality control of eggs and egg products. Enrollment for the classes consisted of key plant personnel of member firms of the association.

January 20, 1950

The Emulsol Corporation, Chicago, Illinois

Mr. B. R. Harris, Vice President

Mr. B. M. Shaffer, Vice President in Charge of Production

The Emulsol Corporation is one of the pioneers in the scientific study of pure culture fermentation of egg white. They hold numerous patents on this subject including some of the earliest issued and produce a large variety of albumens for various purposes. Both Mr. Harris and Mr. Shaffer were interested in our process as generally outlined to them and would like to cooperate with the Bureau. An appointment was made to inspect the plant facilities of the company on the next day. The research laboratories were shown during this visit. The laboratories are well equipped and staffed with chemists, chemical engineers, and bacteriologists. The company carries on an active research program with surface active compounds in addition to its work with egg products.

Mid-Continent Food Co., Chicago, Illinois

In response to Mr. Odell's request of the preceding day, I returned to hold an additional meeting with him. He wanted to know in detail just what equipment would be necessary to get into large scale production immediately. I informed him that there were certain factors involved in setting up equipment for pure culture techniques that couldn't be rushed through. Such equipment evidently was not available to him at the time the discussion was held. Realizing the limitations which prevented an immediate headlong approach to the evaluation of our process he nevertheless reiterated again his desire to cooperate fully any time we were prepared to go into the field.

January 21, 1950

The Emulsol Corporation, Chicago, Illinois

According to arrangements made the previous day, the Chicago plant of the company was inspected with Mr. Shaffer. Since no details of our process were divulged Mr. Shaffer showed me the entire plant so that I could judge the equipment for myself. In deference to the implied wishes of the management, no description of their process for the production of dried albumen will be presented. There are present in the plant, however, stainless steel fermentation tanks, DeLaval clarifiers, pan, spray, and vacuum drum drying equipment such that experimental runs varying from 300 to 3,000 lbs. of egg white can be adequately carried out. Ample laboratory facilities are available. There is at present no large scale, i.e. 200 gallon capacity, propagating tank available that is equipped for sterilization of media but there are Pfaudler pressure tanks available that can be readily converted. The conversion

presents no problem to the management since they have available a group of plant engineers routinely engaged in this type of operation in connection with the experimental plant work being constantly carried out. Mr. Shaffer again reiterated his desire to cooperate with the Bureau and also requested our procedure for the determination of reducing sugars in egg white.

January 23, 1950

Omaha Cold Storage Co., Omaha, Nebraska

Mr. H. C. Sheridan, President

Dr. Richard Carey, Chemist

This plant is actively engaged in the production of edible grade albumen. The fermentation is a natural fermentation carried out in stainless steel vats of approximately 1,000 lb. capacity. The fermented white is pan dried at 120°F. and then sold as flake albumen or as powdered albumen after powdering in a hammer mill. The liquid white is clarified in a DeLaval centrifugal clarifier prior to fermentation. Adequate laboratory facilities are available but no equipment for the propagation of pure cultures is on hand.

In addition to dried albumen, the firm produces powdered whole egg, frozen cut-up poultry, and frozen chicken a la king. Mr. Sheridan expressed complete willingness and desire to cooperate with the Bureau and offered all his facilities, including egg white, for such cooperation.

C. A. Swanson & Sons, Omaha, Nebraska

Mr. Gilbert Swanson, President

Mr. M. H. Taras, Technical Director

Miss Harriet Page, Chemist

Mr. Robert Koch, In Charge, Technical Albumen Department

This firm does not produce edible grade albumen. It produces about 500,000 lbs. technical grade pan dried albumen per year. As a result of the surplus white situation, however, they have started experimenting with the fermentation and drying of edible grade albumen. There is no suitable equipment for the production of edible white in the technical department at present. Mr. Koch is carrying out some haphazard fermentations, one or two samples at a time, in 30 lb. tins. He is willing to cooperate to the extent of furnishing about 700 lbs. of egg white.

Mr. Taras and Miss Page appear to be carrying out independent research with yeast fermentation of white and spray drying of the resulting product. One run of 900 lbs. had been carried out but the resulting product was poor, containing a high amount of insolubles. There was no readily available equipment suitable for pure culture fermentation of the type visualized for our process. Mr. Taras, however, expressed desire to collaborate with the Bureau. This desire was also expressed by Mr. Gilbert Swanson, President.

January 24, 1950

Tranin Egg Products Co., Kansas City, Missouri

Mr. W. Russell, Vice-President

Mr. C. A. Rose, Plant Superintendent

This firm produces a naturally fermented pan dried albumen and is one of the largest producers in the country at present. Fermentation is carried out with frozen whites that are permitted to thaw and ferment for 3 days in the 30 pound tins in which they are packed. The fermented whites are then poured into a tank, acidified with lactic acid to pH 5.0, the clear white drawn off and placed in the pan drier for two days. Drying temperature initially is 150°F. and, toward the end of the cycle, 115°F. After 48 hours drying, the pans are removed onto the floor and drying finished by blowing room air over the pans with fans. As a result of this type of operation off fermentations occur frequently. Both Mr. Russell and Mr. Rose were intensely interested in our process and in cooperating with the Bureau. They were impressed by the sample of dried albumen shown them. No facilities are available for plant evaluation of our process on the large scale desired and installation of new equipment is not foreseen. Mr. Rose emphasized, however, that our process would be of great use to him and offered what facilities he had for any cooperative project we had in mind.

January 25, 1950

Doughnut Corporation, Central Laboratories, New York, N. Y.

Dr. Zenas Block, Director of Research

Dr. A. H. Goodman, Director of Processed Food Development Section

The Doughnut Corporation has, in common with other egg processors, a large surplus of frozen egg white on hand. They have been investigating the problem of pure culture fermentation and drying of egg albumen but have not as yet started any laboratory or pilot plant studies. Both Dr. Block and Dr. Goodman were therefore most interested in our process and in collaborating with the Bureau. They offered pilot plant facilities in New York and plant facilities in McKenzie, Tennessee, and had no objection to furnishing as much as 6,000 lbs. of egg white for study. Pilot plant equipment for the fermentation and pan drying of 200 to 300 lbs. of egg white appeared adequate. It was observed that a Sharples centrifuge, essential to our process, was also available. No propagating tank in which media could be sterilized was observed but indications were given that such equipment could be supplied. Complete laboratory facilities and pilot plant baking equipment are available. Dr. Block stated, however, that no exact date could be given when collaborative studies could be undertaken but was anxious that the Doughnut Corporation be considered as a possible collaborator. Dr. Goodman recalled that he had worked with Dr. Hilbert on a collaborative sugar study when Dr. Hilbert was at NRRL.

General Foods Corporation, Central Laboratories, Hoboken, N. J.

Dr. R. R. Baldwin, Director of Biochemical Laboratory

Dr. George Moran, Food Technologist

Mr. R. LaRocca, Associate Biologist

Miss Katherine Sloman, Project Leader, Analytical Laboratory

Since Mr. LaRocca's inquiries, General Foods Corp. has decided not to produce their own dried white and are evidently purchasing albumen from Swifts. They were interested in our process, however, and were impressed by our sample of egg albumen. It is interesting to record that Mr. LaRocca tried fermentations with Streptococci isolated from egg powder and had no success in producing a good grade edible albumen. Dr. Moran was greatly interested in our process. He is evidently continuing studies on fermentation in an effort to set up standards for General Foods suppliers. Only general characteristics of our product were described, no details of our process being divulged. At Dr. Moran's request a meeting was held with Miss Sloman and Mr. LaRocca to discuss our method of determining reducing sugar in egg white. They had encountered trouble with their methods of analysis. Our technique was described and Miss Sloman was assured that a copy of our procedure would be forwarded to her.

January 27, 1950

Henningson Bros., New York, N. Y.

Mr. Victor Henningson, President

A brief talk was held with Mr. Henningson and the purpose of the visit explained. He stated that he was calling their plant in Texas later in the morning and requested that I call back later in the day. On calling back he informed me that Dr. Slosberg, Technical Director, was interested in the process. Mr. Henningson said that he was going to see Dr. Slosberg at the Fact Finding Conference in Kansas City, and would then get more details on possible collaboration. I informed Mr. Henningson that Dr. Solowey would be at the meetings and they could communicate directly with her then.

Standard Brands, Inc., New York, N. Y.

Dr. Charles N. Frey, Director of Scientific Relations

Mr. Hugh Griffiths, Manager, Egg Sales

Dr. Frey initially indicated that Standard Brands was not drying albumen and was not set up to handle dried albumen. After inspecting our sample and hearing of the characteristics of our fermented albumen, however, he indicated willingness to cooperate with the Bureau. He stated that it would be necessary for him to discuss the matter with other parties in the organization and that he would then communicate with us. At this writing Dr. Frey has written that they have available at the Fleishmann Laboratories a 100 gallon capacity stain-less steel tank without heating controls but that such can be supplied. They also have a spray drier and drum drier having a capacity of about 2 lbs. per hour. No DeLaval Clarifier is available. Offer of possible use of other equipment at their manufacturing plant at Peekskill N. Y. or their production plant at Kansas City was made.

January 30, 1950

National Dairy Research Laboratory, Inc., Oakdale, L. I.

Dr. A. H. Johnson, Director of Research

Dr. D. H. Bornor, Assistant to the Director

Dr. J. Allerton, Section Head, Dehydration

Mr. Harvey Fram, Bacteriologist

As mentioned previously in the report, National Dairy Laboratory is conducting an active laboratory and pilot plant investigation for Ovson Egg Products Inc., dealing with the fermentation and drying of egg albumen. A plant will be built or purchased by Ovson to produce dried albumen based on the process developed by National Dairy Research Laboratory. They are in their earliest stage of work and are intensely interested in our program and in possible collaboration with the Bureau. An inspection of their facilities revealed an exceptionally fine laboratory and pilot plant set up, very well staffed. There are available a variety of temperature controlled fermentation vats, a pan drier, 2 spray driers, and 1 vacuum drum drier. In addition, there is a propagating tank for the production of pure cultures capable of sterilizing about 50-75 gallons of medium, under pressure. A Sharples super centrifuge is fortuitously situated beside the propagating tank. Each of the driers is serviced by two chemical engineers. There is a complete well equipped and staffed bakery for the evaluation of the albumen in baking tests and there are also completely equipped and serviced analytical and bacteriological laboratories. The equipment is such that experimental runs of 100-500 lbs. of egg white can be readily handled. Dr. Johnson is most desirous of being considered as a possible collaborator.

Summary

Fifteen firms, representing a cross section of the egg processing industry, were visited. The visits were made to obtain the industry's reaction toward possible evaluation of the Microbiology Research Division's egg white fermentation process under pilot plant or commercial conditions. With no exceptions, all the firms in a position to do so offered to cooperate with the Bureau, despite the fact that no specific details of the process were presented at the time. The surplus of frozen egg white, the large potential market for good edible dried albumen in premix cakes, and the evident absence of a good fermentation process, were motivating factors in the industry's interest.

Recommendations

On the basis of equipment, laboratory and bakery facilities, technical and scientific personnel available, economic considerations for transportation of Microbiology Research Division's personnel and availability from Beltsville, it is recommended that evaluation of Microbiology Research Division's egg white fermentation process under pilot plant conditions be carried out with National Dairy Research Laboratory, Inc., Oakdale, L. I., as collaborator. A further consideration in

Recommendations (continued)

recommending the above organization is that a new plant will be built or a plant converted to produce fermented dried egg albumen based on the above pilot plant studies, if successful. The plant will be established by Ovson Egg Products Company, Chicago, Illinois, as subsidiary of National Dairy Company.

Arthur M. Kaplan
Arthur M. Kaplan, Bacteriologist, Microbiology
Research Division
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